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Book Reviews

STUDIES IN BIOLOGY, NO. 37. PHOTOSYNTHESIS. 3rd Edition. By D.O. HALL & K.K. RAO, pp. 85. Edward Arnold, London (1981). Price £2.75

The ranks of those admitting to working on photosynthesis include those interested in disciplines as widely separate as quantum physics and field ecology. Consequently an overall detailed understanding of this biologically significant and intrinsically interesting phenomenon is usually beyond the scope of even those actively researching a particular aspect of photosynthesis, as well as those requiring an understanding appropriate to teaching the subject in schools. The need for an overview of photosynthesis is therefore very strong and this admirable little book has aimed to fill this requirement since 1972.

The present (third) edition retains the basic characteristics of the earlier editions—description of the processes involved in photosynthesis, indications of the research which has led to the acquisition of modern knowledge and opinions on the directions future research may take. An important aspect of the appeal of the book is the enthusiasm of the authors for their subject and the excitement of research and discovery which is clearly transmitted to the reader throughout the book. The present edition has been updated in its coverage of membrane structure, electron transport and photophosphorylation in plants and bacteria, C_4 and CAM photosynthesis and photorespiration—all areas in which significant advances have been made since the last edition.

Many aspects of nitrogen, sulphur and lipid metabolism are powered as directly by light as is carbohydrate metabolism and can justifiably be considered as photosynthetic. Their omission represents one of the few weaknesses of this very useful book.

Clearly, in order to succeed in providing an overall coverage of its vast and complex subject and yet remain conceptually and physically handleable, the book could not hope to provide detailed treatment. Accepting the inevitability of this has allowed Hall and Rao to put together a very valuable, readable and up-to-date introduction to photosynthesis which can be recommended wholeheartedly to anyone seeking a more than superficial coverage of the subject but whose needs are satisfied by a less than detailed treatment. The book must be as successful as its previous editions.

W. COCKBURN

STUDIES IN BIOLOGY, NO. 48. PLANTS AND MINERAL SALTS. 2nd Edition. By J.F. SUTCLIFFE & D.A. BAKER, pp. 66. Edward Arnold, London (1981). Price £2.50

In revising this useful introduction to the subject, the authors have re-allocated space, devoted in an earlier edition to historical perspectives, for succinct discussions on such matters as the physiological roles of essential elements, the significance of proton transport and the functional design of the root system. Such changes are well made and give a more up-to-date feeling. This is undermined by undue reliance on very familiar old diagrams and tables from earlier text books. Some of this material has outlived its usefulness, e.g. the table on p. 53 which infers the mobility of nutrients within the plant from the fate of abnormally large applications of unmetabolised nutrients to leaf surfaces. More up-to-date illustrative material is available and should have been used.

Where such masterly compression has been achieved and such a broad canvas sketched upon, it is both easy, and a trifle unfair, to examine the text too critically. There are, however, a number of places where opportunities have been missed to set the record straight. For instance, I found it irritating to see, on p. 28, that aluminium toxicity is still discussed in terms of phosphate precipitation—an idea laid to rest more than 20 years ago. It is also odd that there is no description of the salient features of membrane structure of lipid/protein interactions in a book which goes into matters such as membrane potentials, carrier theory, etc. This could have been done quite simply and is certainly no more difficult to comprehend than many of the matters selected for discussion. Ideas about regulation of carrier activity by allosteric mechanisms have been with us for a number of years. They are, indeed, hinted at for those who know enough to read between the lines, but a bolder statement should have been made to the effect that internal concentrations of ions have a much greater influence on the activity of transport systems than external ones. It is in this respect that so many of the conventional statements of transport kinetics have misled generations of students.

The book is intended for elementary students and for them it can be recommended without hesitation. It could also be useful for those who consider themselves more knowledgeable. They can play an amusing game with Professors Sutcliffe and Baker. As the latter pair strive valiantly to condense and

simplify, such readers can see how many lines they can read before they cry 'Yes, but!'.

D.T.CLARKSON

THE STUDY OF PLANT STRUCTURE: PRINCIPLES AND SELECTED METHODS. By T.P. O'BRIEN & M.E. MCCULLY, pp. x+317. Blackwell Scientific Publications, Oxford (1981). Price (Cloth) £20.00 (Paper) £12.00.

This is an important botanical text, one that should be consulted by every biologist working with plant material. The structure of the organism has been ignored for too long by physiologists, biochemists and ecologists, and yet the structure holds the key to the performance of the plant. Not that this is a book about structure; it is far better, a book on how to find out what the structure of your particular plant is. The authors have attempted what most of us fail to do, i.e. to pass on information on how to tackle the practical problems. They have also by-passed the publishers and produced it themselves (try the publisher's name, Termarcarphi—anagram specialists and friends of the family will succeed here) from camera-ready typescript, thereby making it available at a realistic price. The presentation of the book, with its typescript text, is quite acceptable, even though it has inevitably led to a bulky volume. The standard of typing is excellent, with only a very few errors. Similarly the references are accurately cited, although I did find one omission which has no doubt caused the authors some embarrassment. The text is well illustrated with line and half-tone plates and two superb pages of colour photomicrographs. The standard of all these is high, and collectively they provide examples of many of the techniques and methods available in botanical anatomy.

The book consists of six chapters, which advance from a general inspection of the problems involved in ascertaining plant structure to the instruments and methods available, and finally to detailed instructions which attempt to cover every contingency that might arise in the laboratory. The preface and introduction to the first chapter are the only parts of the book which provide the authors with an opportunity to put forward a general statement of their philosophy and approach to the study of plant structure, since there is no final chapter or conclusion that allows them to survey and gather together what has gone before. The opportunity has not been missed; it has been grasped, but it has not been totally effective. It justly criticizes those who neglect plant structure and it forges the link between structure and function, but it lacks a positive driving force. The zeal of the explorer, the excitement of discovery and revelation are missing; the impetus to carry the reader forward into the rest of the book is not there. This is unfortunate and certainly out of keeping with the character of the authors who are inspiring people to listen to and work with. The introduction also fails in another important respect; it does not explain, or introduce, the organization of the book as a whole, a topic I will return to later.

Since we are observers of structure, the first chapter introduces us to our senses, our methods of perception and the general theories of light, lenses and microscopes. The second chapter examines microscopes, from hand lenses to the electron microscope. This chapter provides details of the theory, design and general use of these instruments, with especially useful sections on the range of light microscope systems available and their applications. There has been marked tendency in the past decade to concentrate on electron microscopy, using the brightfield light microscope to examine the occasional thick section and a hand lens to check the focus of electron micrographs. This approach would certainly meet with the most severe criticism from the authors, and rightly so. The third and fourth chapters deal with general methods of approach to plant structure—whole plant parts, organs, etc in one and sections in the other. These chapters are gold mines of useful information. Rich in sound ideas for tackling the problem of structure and in practical details of how to go about it. Chapter five is basic photography, and should not be given a miss, especially by those who think they know it all. As the authors emphasize, all the critical preparation steps will be wasted if not backed up by a proper means of recording the final image.

Chapter six: the title 'Formulary' conjures up an image of a mediaeval alchemists den, and on inspection it appears to be similar, with pages of recipes and references back to 1879. This is the heart of the book, occupying a third of the text, although a calculator is required to come to this conclusion as the pages are numbered by chapters. This one chapter, with its scores of invaluable recipes, references, notes, comments, warnings and general advice, should make us all extremely grateful to the authors for their long hours of toil and labour in this enterprise. The title of the book—*Selected Methods*—is honest, but I doubt that many will use any of the methods omitted from this work. Various appendices follow, plus a list of references which continues to be helpful by providing the full titles in each citation.

No work of this scale and scope can expect to escape criticism, and the following comments should only be regarded as advice to intending readers and a hint to the authors as they contemplate a second edition. The book lacks an index. It must be said that it was lazy of the authors not to prepare one, they have done a disservice to the lazy people, 'the man in a hurry' syndrome in the authors' parlance, who like to find the page they want immediately and not be bothered with the rest of the text. There is, by way of compensation, a very detailed 'Contents', which lists all the text headings (apart from a couple of

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